

CLAIMS

1. The automatic fire extinguishing method using liquified CO₂ to regulate the distribution of fire extinguishing agents characterised in that this method uses liquid CO₂ as: an independent fire extinguishing agent or combined with other fire extinguishing agents to create new fire extinguishing agents which have strong effects and high efficiency; as a dynamic source producing pressure in the tank to push fire extinguishing agents into the fire area, and as a dynamic source of the entire fire extinguishing system and automating the process consisting of the following stages:

a. preparation:

- deciding the amount and category of the fire extinguishing agent needed for the protection of the object in accordance with the regulations;

-deciding the liquefied co₂ needed for the entire automatic fire extinguishing process, installing the permanent liquefied co₂ containers on the scale or using the specialised level indicator to check the weight regularly and make an alarm in case of shortage;

- connecting the co₂ containers and supplying co₂ to the pressure adjusting device;

- adjusting the co₂ supplies to the needed pressure as required by the fire extinguishing system to provide pressure for the fire extinguishing agent tanks, the device for opening and closing valves, the alarming system and automatic power switch-off system operated by pressurised air;

- pipelining the whole fire alarm and fire extinguishing system with a system consisting of 2 high pressure containers placed at positions favourable for recovering the fire agent which has been used. these two containers are able to alternate their functions of supplying or receiving the fire extinguishing agent after going through the settling and oil separating system;

- with the exception of the water tank, the entire remaining permanent high pressure system is regularly supplied with stable CO₂ to dissolve CO₂ in the fire extinguishing agent, creating new fire extinguishing agents and making them ready for operation.

b. fire extinguishing:

in case of fire, the temperature increases to the prescribed sprinkler, the fire alarm thermal sprinkler is broken discharging the fire extinguishing agent and creating a pressure decrease which activates the fire alarm and the power switch-off device of the protected object, and then pushing the fire extinguishing agent into the fire.

c. recycling and compensation of the fire extinguishing agent:

- after being used, the fire extinguishing agent discharged into the water drainage gutter is recovered by: making a branching pipe from the fire extinguishing agent supplying pipeline, so that when the fire alarm signal is received, the reversing valve will automatically function to close the gate of the normal water waste drainage system and to allow the fire extinguishing agent to run through the settling, filtering, oil separating system through one-way valve and returning to the receiving container;

- when the fire extinguishing agent in the container, which is in operation, becomes low, the level indicating float is lowered, opening the supplying pipe of CO₂ for the reversing device to open the valve supplying CO₂ increasing the pressure in the tank, which is already filled with the fire extinguishing agent, so that the fire extinguishing agent continued to spray, opening valve discharging the pressure in the low tank to turn it into a receiving container of the naturally returning fire extinguishing agent; at the same time receiving additional fire extinguishing agent from the reserved tank through the distribution system so as to fill up the container promptly;

- the process is repeated until the fire extinguishing is completed.

d. creating the varied capability to extinguish fires for the automatic fire extinguishing system by means of: branching various CO₂ pipes so as to push specialised fire extinguishing agents from their containers to the appropriate objects to avoid damage to them caused by the agents themselves. In concrete:

- if water is used to extinguish fire directly for petrol, oil (or indissoluble substances lighter than water), we should adjust the pressure and select the suitable type of drencher to ensure water is sprayed into mist with droplet size being as required by the technological specifications (smaller than 100 micrometers);

- in case foaming agent is added to the water to put out fires caused by petrol or oil in the traditional method, the sucking of additional foaming agent with a suitable ratio is carried out by means of injectors installed on the water supplying pipe;

- as for special objects where fires are allowed to be extinguished by CO₂ only: when the fire alarm sprinkler is broken, the pressure decrease activates the automatic valve open device to receive CO₂, start the alarm for workers to evacuate, and then close the ventilator and spray CO₂ directly into the burning place;

- as for the area have the temperature lower freezing point of water or the objects where fires are allowed to be extinguished by specialised foam (or chemical powder): fill the required extinguishing agents in the pressurised containers. When the fire alarm thermal sprinkler is broken, the pressure decrease activates the automatic valve open device to receive CO₂, start the alarm for workers to evacuate, cut the power off the protected object and spray the suitable specialised fire extinguishing agent into the burning place;

- as for the fires where there is no fixed spray network: use the fire hose installed in the walls for extinguishing;

e. installation: the whole system can be installed fixedly or on moving vehicles, even in the places where there is absolutely no electricity or generator.

2. Automatic fire extinguishing system using liquefied CO₂ to regulate the distribution of fire extinguishing agents consists of the following equipment:

- the ordinary water tank for fire extinguishing.
- the containers providing sufficient liquefied CO₂ for the whole process of fire extinguishing, creating new fire extinguishing agents and automating the process.
- the scale or device for automatic checking the weight of CO₂ permanently. When CO₂ is lower than the needed amount, it will start the alarm signal.
- the automatic pressure adjusting device
- the reversing device closing the valve to supply CO₂ to the high pressurised water tank and to discharge CO₂ for the tank running out of CO₂;
- the reversing device open/closing the valve to supply the fire extinguishing agent from the high pressure tank to the distribution system;
- the device for receiving signals from the fire alarm system, automatically opening the valve supplying the fire extinguishing agent from the distribution to the alarm bell and to the power switch-off device of the object to be protected, and then to the fire extinguishing drencher;
- two high pressure tanks placed at positions favourable for receiving the naturally returning fire extinguishing agent with level indicating float valves at the bottom: when the fire extinguishing agent is running out, the float is lowered opening the valve connecting to the CO₂ supply to the reversing devices to open the valve supplying CO₂ to create pressure for the tank filled with water and discharging pressure for the running-out tank to receive the returning fire extinguishing agent;
- the fire alarm self-breaking sprinkler discharges pressure when the temperature increases to the required level;
- the fire alarm bell or water bell starts for people to evacuate when the fire extinguishing agent is sprayed;
- the device using pressure to switch off power for the object to be protected so as to ensure safety during the fire extinguishing process;
- the pipeline and the automatic valve supplying CO₂ to the high pressure containers of specialised fire extinguishing agents, the devices for alarm, power switch-off and closing ventilators when receiving the fire alarm signals to put out the fire for special objects;
- the safety valve and the pressure meter for the high pressure tanks, specialised high pressure drenchers for spraying water mist when water is needed to put out fires caused by petrol or oil;

- the self-sucking injectors to supplement foaming agent with a suitable ratio added to water to put out fires caused by petrol or oil, using the flow of water circulating in the pipe as a sucking dynamic;
 - the device using pressure to reverse the closing gate of the ordinary water waste system and opening gate to allow the fire extinguishing agent to return to the settling, filtering and oil separating system;
 - the system for settling, filtering, oil separating and the system for regulating and distributing the reserved water to fill up the receiving container promptly;
 - valves, pipe, hose, the fire extinguishing equipment installed in the walls;
 - all the high pressure devices are interconnected by pressure sustainable pipe and provided with enough pressure by CO₂ dissolved in the fire extinguishing agent;
 - with the liquefied CO₂, water or any fire extinguishing agent which is defined on the basis of the standards and regulations for fire protection and prevention, the physical and chemical properties of CO₂ as well as the technological specifications of the object to be protected;
3. New fire extinguishing agents are produced by the method described in 1 by means of: filling the already known fire extinguishing agents in the system described in 2 so that CO₂ under operating pressure dissolves in them, creating new fire extinguishing agents, which have the function of extinguishing fires owing to their inherent nature and that of carrying and discharging CO₂ into the burning place right in the first spray to increase the fire extinguishing effect.
4. Liquefied CO₂ mentioned in 1, 2, 3 can be replaced by any on-inflammable compressed gas or liquefied gas.